Using linear electrodynamic quadrupole trap for drop pattern formation and nanoparticle aggregates production from drying colloidal microdroplets of suspension

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Electrodynamic quadrupole trapping of microparticles provides a contactless approach for optical measurements of microdroplets of different compositions, aerosols, and dust grains [1,2]. The use of the linear electrodymic quadrupole trap (LEQT) [3] can provide unsupported solvent drying, well-defined aggregate morphology evolutions from colloidal droplets of suspension as well the possibility to deposit ("soft-landing") the final dry microproducts on a substrate and analyze them offline by scanning electron microscopy (SEM) [4,5].

In this presentation, we will demonstrate advancements in the use of the LEQT to produce various nanoparticle aggregates of interesting structural properties from drying microdroplets of colloidal suspension. The final products were carefully deposited on a substrate and analyzed offline with scanning electron microscopy. Highly-ordered aggregates of silica nanoparticles, aggregates of gold and silica as well as aggregates of silica with crystallized sodium dodecylsulfate (SDS) will be presented. Additionally, we will present SEM analysis of intermediate drying drop deposits and the manner in which SDS alter these deposits/patterns with time and SDS concentration. Our ability to deposit intermediate drop patterns and complex dry aggregates of different morphologies with unique properties using the LEQT and offline SEM analysis is desirable in many applications.

References

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